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U.S. Team Visit to France on Health Care Facilities

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National Bureau of Standards
Washington, D. C. 20234

Final Report

April 1977

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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U.S. DEPARTMENT OF COMMERCE, Juanita M. Kreps, *Secretary*

Dr. Betsy Ancker-Johnson, *Assistant Secretary for Science and Technology*

NATIONAL BUREAU OF STANDARDS, Ernest Ambler, *Acting Director*

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U.S. Team Visit to France
on Health Care Facilities

by

Samuel Kramer
Robert Kapsch

Center for Building Technology
Institute for Applied Technology
National Bureau of Standards

ABSTRACT

The U.S. Center for Building Technology (CBT), Institute for Applied Technology, National Bureau of Standards, and the French Centre Scientifique et Technique du Bâtiment (CSTB) regularly exchange special study teams for selected areas of building technology. This report is on the visit of the U.S. team to France on health care facilities, held in April 1972. The U.S. team consisted of representatives from the Center for Building Technology; the Department of Defense; the Veterans Administration; and the Department of Health, Education and Welfare. The team visited health facilities in Paris, Meaux, Dijon, Beaune and Lyon. Innovative methods for the planning, design and construction of French health facilities were reviewed by the team participants. This report contains the findings and observations of the team. These findings and observations were originally recorded in a letter report which was exchanged with members of the U.S. team and the respective cooperating groups in France. However, it is felt that the documentation of the observations in the open literature is important for record purposes and will provide a source document for future discussions on the planning and design of medical and health care facilities.

Key Words: Architecture; building technology; construction; health facilities; hospitals; medical facilities; medical planning.

PREFACE

The purpose of this report is to summarize the observations made by the U.S. team members during their visit. It is important to note that the observations made were those of the individuals and do not represent nor should they be interpreted as necessarily representing the official views of the National Bureau of Standards or any other agency providing representation on the U.S. team. The observations noted herein were originally recorded in a letter report which was exchanged with members of the U.S. team and the respective cooperating groups in France. However, it is felt that the documentation of the observations in the open literature is important for record purposes and will provide a source document for future discussions on the planning and design of medical and health care facilities.

I. INTRODUCTION

With the growing emphasis and demand for health and medical care facilities, the Center for Building Technology staff, the design and construction profession, and the health services agencies are focusing on the timely delivery of these facilities.

As part of the U.S./French Cooperative Program on Building Technology, the third U.S. team visited France during the period of April 16 through April 30, 1972, to observe the French approach to the planning, design, construction, and delivery of health care facilities. The French Centre Scientifique et Technique du Bâtiment (CSTB), the National Bureau of Standards' Center for Building Technology counterpart organization in France, provided the means for a multi-agency approach to a problem of major concern to both the United States and France. To insure the broadest representation and overview, the U.S. team was composed of representatives of NBS and other Federal agencies concerned with health and medical care facilities. The members* of the U.S. team were as follows:

Samuel Kramer, Team Leader
Chief, Office of Federal Building Technology
Center for Building Technology (CBT)
Institute for Applied Technology (IAT)
National Bureau of Standards

---

*The organizational affiliations of the team members represents the status of the individuals at the time of their visit in April 1972.

Faye G. Abdellah, Ed. D., LL.D., R.N.
Chief Nurse Officer and Assistant Surgeon General
U.S. Public Health Service, Department of Health,
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Laurence O. Gibbons
Director, Health Care Facilities Service
Department of Medicine and Surgery
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Viggo P. Miller
Assistant Administrator for Construction
Veterans Administration (VA)

Robert L. Rosenberry
Staff Assistant to the Associate Deputy Administrator
Department of Medicine and Surgery
Veterans Administration (VA)

Grady Smith
Director, Office of Architecture and Engineering
Health Services and Mental Health Administration
U.S. Public Health Service, Department of Health,
Education, and Welfare (HEW)

The NBS representative served as chairman of the team.

The team focused on the application of the latest planning, design, and construction techniques being employed in France for health and medical care facilities. Some of the specific areas of interest were as follows:

- The application of industrialized construction methods
- The use of new materials
- The use of new construction techniques and methods aimed at speeding the delivery of the completed facility
- The recognition of the need for flexibility in the structures to meet changing needs
- The environment created within the buildings
- The economics of the facilities considering life cycle costs including initial costs, the operating costs, and the anticipated costs for renovation and rehabilitation

II. BACKGROUND

During a Paris meeting in 1969, the Presidents of the United States and France discussed their mutual desire to renew scientific and technical cooperation between their respective countries. One of the end results of their discussion was the establishment of a cooperative information exchange program focused on building technology between the U.S. National Bureau of Standards' Center for Building Technology (CBT), Institute for Applied Technology (IAT), and the French Centre Scientifique et Technique du Bâtiment (CSTB).

The purpose of the program was to encourage scientific cooperation between the U.S. and France so as to allow both countries to move forward with significant research and development without costly, time-consuming duplication of effort.

In addition to the exchange of technical information and individual scientific personnel, the program included provision for shorter-term exchange visits by American and French teams to compare progress in various aspects of building technology.

The first U.S. team to visit France under this agreement, in November of 1969, was concerned with the overall scope of investigations to be pursued by the exchange teams: economic appraisal of buildings; qualitative assessments; industrialized buildings, and related topics. A French team returned the visit in January, 1970, and spent approximately two weeks at CBT. Subjects discussed included urban acoustics, climatology, fire research, single-family housing, lightweight construction, and the performance concept.

Subsequent visiting teams and individuals investigated the progress in such areas as environmental engineering, the effects of sonic booms on buildings, and experiments in the rehabilitation of existing structures.

Initially, the visits dealt specifically with technical matters in applied building technology. Early in 1972, however, plans were made for a special U.S. team to visit France to examine the application of modern planning, design, and construction techniques to a particular building type—health care facilities.

The team, which visited France in April, 1972, was headed by Samuel Kramer,* then Chief of the Office of Federal Building Technology, CBT. Whereas previous teams were composed entirely of building researchers from CBT, this U.S. team included representatives of other U.S. federal agencies with an interest in health facilities planning—the Department of Health, Education, and Welfare, the Veterans Administration, and the Department of Defense.

The following report documents the visit (see itinerary, fig. 1) and the observations and conclusions of the team members.

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*Presently Deputy Director, Center for Building Technology, Institute for Applied Technology, National Bureau of Standards.

FIGURE 1. ITINERARY: AMERICAN TEAM ON MEDICAL FACILITIES VISIT TO FRANCE

III. THE FRENCH HEALTH CARE DELIVERY SYSTEM

The progress of the French in developing health policies and coordinating the process of health care delivery has been remarkable. In the opinion of at least one member of the U.S. team, the French health care system compares favorably in many respects with that of the United States, particularly in that it provides some type of comprehensive coverage for every citizen. Yet, the first steps toward coordination date back only to 1958, when legislation was passed requiring the development of a procedure for determining need before either a public or private hospital could be built.

The most sweeping regulatory change came in 1970, with the passage of a Hospital Reform Law which established a public hospital service for France, under the direction of the Ministry of Health and Social Security.

With the passage of the Hospital Reform Law, the Ministry became an umbrella organization with jurisdiction over a number of existing health care delivery plans—maternal and child health, "family benefits," and certain plans sponsored by French industries (e.g., mining and railroads) for their workers.

Public Hospital Service

Although labeled "public," the hospital system created by the 1970 legislation also includes private institutions if they can meet the staffing and services criteria for public hospitals.

The mandate of the Public Hospital Service as set forth in the 1970 law also provides for medical, nursing, and paramedical education, research, and coordination of preventive medicine as well as diagnosis and treatment of acute and chronic conditions.

The organizational structure of the system is based on "regions" and "sectors." The region is a geographical division corresponding to the old French provinces, while sectors are based on demographic factors—each sector is a subdivision of a region, capable of providing health care for between 30,000 and 100,000 people, with its boundaries defined in terms of the time a patient requires to reach the hospital.

In general, sectors provide acute medical and surgical services and obstetric services; more specialized institutions are provided at the regional level (for example, the Hôpital Cardiologique at Lyon, one of the institutions visited, provides cardiac surgery for the entire region). The organizational structure provides for the creation of regional and sector inter-hospital groups and unions, which permit sharing of services, medical and paramedical training, planning assistance, and financial resources and management to some extent. Patients are referred to regional centers for specialized treatment not available at the sector level.

SCIC

Considerable funding for capital expenditures for construction comes from the SCIC (Société Central Immobilière de la Caisse des Depôts), or central building society, which is

empowered to draw on French savings deposits to finance the construction not only of hospitals, but also of housing, commercial and office facilities, social and cultural centers, residences for the aged, and resort complexes.* In addition to financing, SCIC also provides coordination and supervision of design and construction of these facilities.

Medical Research

Medical research is the primary province of the Institut National de la Santé et de la Recherche Medical (INSERM), another facility visited by the team. INSERM is analogous to the National Institutes of Health (NIH) in the United States. INSERM does not have a large, centralized medical research campus like that of NIH in Bethesda, Maryland; its activities are carried out in a number of public hospitals located throughout France.

Finance

Each sector is supposed to be self-sufficient in its financial operation. Forty percent of sector medical expenditures are financed by the state, 30 percent by social security, and the remaining 30 percent from private sources.

The French with whom the team spoke considered their health care system expensive. At the time of the visit, it was reported that medical care and public health accounted for approximately nine percent of the French Gross National Product (GNP) in comparison to 7.8 percent of GNP for the United States. The same individuals also felt that health care expenses as a percentage of the French Gross National Product would continue to increase in the coming years.

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*SCIC operates entirely within France; a counterpart, the Société Central pour l'Équipment du Territoire-International (SCET) handles financing and construction of many French building ventures abroad.

Total medical care and public health expenditure in 1972 amounted to 37 billion francs (U.S. $6.7 billion at the 1972 exchange rate). Hospitalization costs accounted for 15 billion francs (U.S. $2.7 billion).

It was reported that health care costs had increased from 2.6 percent of GNP in 1967 to the nine percent figure in 1972. The French attributed the increase to inflation, social and technical progress, and the management complexities encountered in the health care system.

The general feeling was that since little can be done about inflation, and since social and technical progress is desirable, efforts should be concentrated on the design of the system of institutional management.

Therefore, 1975 was established as a target date for achieving certain objectives to that end: an emphasis on management control, increased attention to investments, encouragement of economic research, and completion of an intensive cost analysis study, using a computer to process data provided by participating hospitals.

Planning Criteria

Before any hospital beds are added to the existing inventory, approval must be obtained from the Ministry of Health and Social Security. National and regional coordinating commissions review requests and recommend approval or disapproval to the Ministry, based on bed population indices projected over the next ten years.

Estimates are made on the criteria of 3.0 medical beds, 2.5 surgical beds, and 0.6 maternity beds per 1,000 population. Occupancies and average length of stay per category are also considered.

Occupancy rates for medical and surgical cases in public institutions average around 75 percent; for private institutions, 85 percent—somewhat lower than most acute general hospitals in the U.S. would consider acceptable. Average length of stay for medical patients is from 12 to 17 days; for surgical patients, 11 to 14 , and for maternity patients, 5 to 8. Again, these represent generally longer stays than are common in the U.S.—probably an indication of the need for more convalescent and rehabilitation facilities, to relieve the load on the acute general hospital.

The need for convalescent, chronic, and rehabilitation facilities is a major factor in long-range planning in France. As of 1972, long-term care was provided primarily in private hospitals, although a number of former tuberculosis sanatoriums were being converted to provide such care.

Housing for the elderly, and combined medical/educational facilities for handicapped and retarded children, are also viewed as vital services that should be provided under the over-all health and social security system. Some facilities of these types were visited by the U.S. team.

The handicapped children's facilities, known as Instituts Medico-Educatifs (IMEs), are found at locations throughout the country. (More complete descriptions of the IMEs at

Sarcelles and St. Denis are found in Sec. VI.2.) The buildings are built to standard plans and make considerable use of prefabricated components.

The IMEs provide education and medical care and rehabilitation to all their patients. Approximately one-third are domiciled there, while the remainder commute from their homes.

Various efforts were underway in hospitals throughout the country to remove non-acute patients from acute hospital facilities; among these was a building systems study (described in Sec. V) aimed at providing standardized and prefabricated nursing and/or domiciliary units that could be "plugged in" to existing facilities to relieve congestion in acute-care areas.

IV. GENERAL REACTONS OF THE U.S. TEAM

If the U.S. visitors shared a single impression of the recently constructed institutions they visited, it was that the hospitals were designed with great empathy for the patient and his family, and a resulting concern for making the hospitalization experience as humane as possible for all concerned—though some of the design/operational solutions might be considered expensive by U.S. conventions.

This concern arises in part from the fact that the average French citizen does not view hospitalization as a normal part of the process of recovering from an illness or injury, but rather as a highly unusual and threatening episode, and one which is approached with a high degree of apprehension.

The French empathy for the patient was demonstrated in innumerable ways. In one major hospital visited by the team, brightly-dressed hostesses met patients and their families, escorted the patient to his room, and then returned to talk with relatives, explained the procedures to be performed, and shared the waiting-period with the anxious family.

This concern for patients and families is also expressed in the design of the physical facilities. Several team members remarked on the large amount of space devoted to lobbies and reception areas, and the attempts to provide particular amenity in such public spaces by the inclusion of shops, attractive furniture and furnishings, art and sculpture, and similar amenities. (One U.S. team member felt that, compared to current U.S. practices, the amount of space for these amenities would be considered excessive.)

Patient areas as well as public spaces had their humane touches, although room finishes and furnishings were often less elaborate than in the lobbies and other public areas. One visitor was struck by the fact that a cobalt-treatment room in one of the hospitals featured wood-paneled walls and piped-in music --- efforts to eliminate as much anxiety as possible from a necessarily stressful experience.

The convenience of the staff appeared to take second place to the concern for patients' emotional well-being, in the design of the hospitals visited. Nursing units with long single corridors, which provided each patient room with the best possible view, also resulted in longer travel-distances for the nurses. At Beaune, where the rooms on one side of the corridor were oriented to a particularly attractive view, a special effort was made to put as many patients as possible on the view-side of the corridor, rather than grouping them in the rooms closest to the nurses' station to minimize nurse-travel.

Another example of concern for patients' well-being was seen in the obstetrical unit of a fairly new general hospital. Rather than a central newborn nursery, for maximum efficiency of nursing staffing, there were small nurseries between each pair of postpartum rooms, with glass partitions on the bedroom side—so that each mother could keep a watchful eye on her infant at all times.

Aside from this frequently observed concern for the humanity of the environment, the team was impressed with French efforts to provide maximum flexibility for changes in services and technology. This was most frequently accomplished by means of almost total separation of nursing units from

ancillary facilities, in such a way as to allow remodeling or complete replacement of the latter with minimal disruption of the nursing areas. This is in contrast to the "interstitial space" approach frequently seen in the U.S., which is capable of providing enormous flexibility but at the cost of greatly-increased building cubage.

An innovative approach, compared to American systems, seen at a number of institutions, was a totally centralized nurse-patient interaction system. Developed in Brussels some years ago, the system is now being installed throughout France in large hospitals.

When a patient presses his nurse-call button, no signal appears outside his room or at the nurses' station on his unit. Instead, he is placed in voice-contact with an operator at a central console serving the entire hospital—sometimes 1,000 beds or larger. The operator inquires as to the nature of the patient's need and, if necessary, electronically alerts the nurse nearest his room, who then enters the room and immediately presses a button to indicate to the operator that the call has been answered.

Hospital personnel claimed that the system does not require any special medical knowledge on the part of the operator, who makes no medical judgments. Some of the visitors were skeptical, but felt that in the hands of an operator with some practical medical knowledge—a specially trained nurse, for example—the system might be useful for assigning priorities for attention by the medical staff (triage).

Planning for the care of the elderly and chronically ill, and for handicapped and retarded children, was viewed by the U.S. team as a great strength of the French system. Team members were particularly impressed with the stress given to locating the institutions for these groups in close proximity to each other and other segments of the population, in order to make their lives as pleasant and near-normal as possible.

Finally, the team concluded that merging the French humanistic approach and the American dedication to efficiency of operation might produce the optimum system and facilities for health care.

V. SYSTEMS BUILDING PROJECT FOR HEALTH FACILITIES

As mentioned earlier, one of the most pressing problems with health-care delivery in France is moving chronic, long-term, and elderly patients out of acute hospital units, so that these hospitals can be modernized and utilized more efficiently.

The U.S. team was particularly interested in a project aimed at accomplishing this, a scheme for producing standardized nursing units and the related support facilities suitable for industrialized fabrication. The project was presented during a briefing at the Ministry of Health.

A competition was sponsored by CSTB for the Ministry of Health, to develop units that could be used equally efficiently for acute, semi-acute, convalescent, or chronic patients; for the aged (both ambulatory and bedridden, and including senile patients); and for psychiatric care—inpatients as well as outpatients on day-hospital or night-hospital regimes. The competition also sought units which could be readily "plugged in" to existing facilities.

A joint venture including architects and the fabricators of concrete components, with fabricating plants located throughout France submitted the successful design concept which was based upon a 3.6 meter (11.8 ft.) module, a multiple of the European 0.3 meter module for most spaces. Most inpatient areas featured an off-center single-corridor plan, permitting semiprivate rooms along one side of the corridor and single rooms along the other.

Flexibility of distribution of services was accomplished through relocatable panels.

The system was designed to allow individual architects as much freedom as possible in arrangement, siting, etc., with the stipulation that connections with existing facilities must be direct, and achieved by means of enclosed passageways, either above or below ground-level.

VI. INDIVIDUAL INSTITUTIONS VISITED

1. Hôpital Général à Clamart (Clamart General Hospital)

Clamart, a suburb of Paris, is the location of this new (1970) 500-bed general hospital operated by the Assistance Publique of Paris.

The functional program stipulated that the hospital was to provide a complete diagnostic and treatment center for its sector, full emergency services, that it should provide the usual medical, pediatric, and obstetrical services of a 500-bed general hospital, and that it "be humane." Clamart is also a teaching hospital, providing medical, paramedical, and nursing education.

The 500 beds are generally divided as follows: general medicine, 196; pediatrics, 96; general surgery, 98; obstetrics/gynecology, 98, and emergency, 12.

To provide the required flexibility, and also to reduce ambiguity of circulation, technical services are separated from nursing units, the former being contained in a low (two-level) building separate from the four-level nursing areas by the main entrance. Nursing units consist of three separate towers, linked by glassed-in bridges at each level. It was stressed that this separation also provided more window-area in nursing units.

Construction is primarily of reinforced concrete, with lightweight metal sunscreens. Many of the concrete elements were factory-fabricated and assembled on the site.

2. Instituts Medico-Educatifs (IMEs—Medical Educational Institutes) Sarcelles, St. Denis

The next institutions visited were not hospitals as such, but institutions which combine medical treatment and education of handicapped and retarded children, in the Paris suburbs of Sarcelles and St. Denis. (Another visited was located at Vaulx-en-Velin, near Lyon.)

The patient population of 120 children at each IME ranges in age from 6 to 16 years old, and includes many other nationalities besides French.

Few of the patients had obvious physical handicaps; apparently their disorders were of the psychological and social/behavioral type. Some were epileptic. The aim of the IMEs was to provide them with medical and educational opportunities in a supportive, noncritical setting.

Approximately one-third are residents at the IME. The other two-thirds commute daily. No special transportation is provided, since the French feel that special buses would stigmatize the children. Instead, parents and guardians are given a subsidy to cover the cost of transportation by private car, bus, or taxi to and from the IME. Families also receive counseling; this program has had good results, in that many of the children have been able to return to their homes and attend regular schools.

The children are divided into small groups (approximately 15 each) to maintain a semblance of a family atmosphere. An effort is made to provide married couples who are also physicians or teachers as "houseparents." Other medical personnel, including general practitioners, psychiatrists,

physical and speech therapists, etc., visit the institutions generally twice a week or as required to meet the special needs of the children.

Although the buildings are physically somewhat austere, obvious efforts have been made to keep a residential scale and to provide as much freedom for the young patient-students as they can handle—few walls and fences, but open lawns where the children can wander.

The buildings are of precast construction, and built to standard plans throughout the country. When asked whether the standardized construction had been used in order to make the buildings readily expandable, the French personnel replied that a new facility would be built where needed rather than expanding an existing one. The philosophy of care in the IMEs requires that the number of patients and size of institutions remain small and responsive to community needs rather than creating large impersonalized institutions.

Each facility includes a gymnasium. It was in one of these that the team saw an example of the progressive therapy philosophy which prevails. Remarking that the gym walls had not been painted, they asked whether the walls had been left bare because of the hard use to which they were subjected. No, they were told, the patients were doing their own decorating—painting murals in their choices of color and design would help them feel that the place was their own, and that they exercised some measure of control over their environment.

3. Hôpital Henri Mondor, Creteil

This large teaching hospital, shown in figure 2, operated by the public assistance administration, is located in the new town of Creteil southeast of Paris. It is typical of the new generation of hospitals being built to meet the needs of the Paris suburbs and thus allow older institutions in the city to undergo modernization.

The hospital, named for an illustrious French physician, teacher, and writer, was three years old at the time of the team's visit. The number of beds then was 1,000 (to expand eventually to 1,200-1,300), and incorporated the following services:

—neurosurgery (90 beds);
—neuropsychiatry (90);
—soft-tissue surgery (two services of 90 each);
—bone surgery (two of 90);
—general medicine (three of 90);
—rheumatology (90);
—cardiology (90);
—gastroenterology (90);
—metabolic disorders (90);
—tumor (80);
—emergency, recovery, polyclinic, and radioisotope (total—105).

The hospital also includes supporting and ancillary facilities including central operating suite (14 operating rooms); diagnostic radiology (16 diagnostic rooms), laboratories, general and technical services, and some domiciliary facilities.

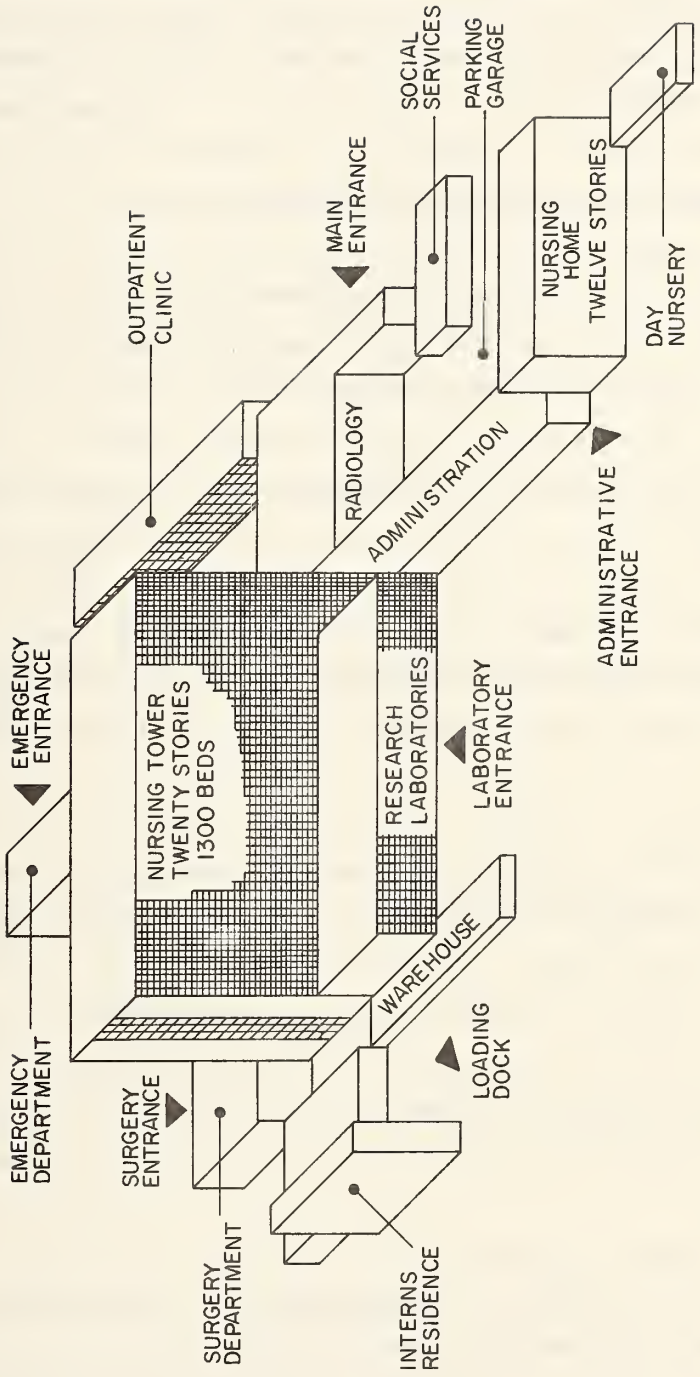

FIGURE 2. SCHEMATIC: HENRI MONDOR HOSPITAL, CRÉTEIL, FRANCE.

Certain other services were not included in the Henri Mondor hospital since they were provided by an existing community hospital in Creteil. These included obstetrics and pediatric medicine and surgery, among others. However, Henri Mondor Hospital is expected to absorb much of the patient load from another local hospital, which can then be devoted to the care of chronic and long-term patients.

Construction is primarily reinforced concrete. Floor slabs are of reinforced concrete covered with an asphalt coping, which is in turn covered with ceramic tile.

Elements of the hospital are grouped into four zones: services requiring considerable staff and public access (admitting, outpatient, etc.); the major hospital block, including medical and surgical services and their respective nursing units; technical services such as heating, shops, etc., and finally, the medical school (Centre Universitaire).

Patient rooms are single, double, or triple, each with its own bath. Radio, telephone, and intercom are provided for each bed. Intercom and pneumatic tube systems connect the various hospital units. The surgical suite, central sterile supply, and medical records area are centrally located.

Meals are prepared in a central kitchen and finishing touches are added in satellite kitchens on the various nursing units.

Entering the main lobby of Henri Mondor, one of the visiting team remarked "You would never know you're in a hospital!" The lobby, one of the largest in any of the hospitals visited,

reminded the American team of the concourse of a large modern airport, with large, diversified shops, restaurants, and other amenities. Murals and considerable use of natural wood were also noted. The exposed wood appeared to pose a maintenance problem.

Construction cost for the facility, exclusive of equipment, was given as 144,900,000 francs (slightly under $30 million U.S.).* of that amount, 130,000,000 francs was for the hospital proper, 12,450,000 for "integrated instruction areas," and 2,450,000 for the INSERM research units located at Henri Mondor. These figures did not include the cost of the Centre Universitaire, or teaching facilities, which were financed separately.

Equipment cost, not including a planned linear particle accelerator, was estimated at 39,888,700 francs (approximately U.S. $8 million).

4. Services des Chroniques (Geriatric Facility) and Centre Hospitalier Regional (Regional Hospital Center), Meaux

Meaux, situated pleasantly on the Marne, is an old and picturesque town with Gallo-Roman ramparts and a 13th-century cathedral.

The geriatric facility, operated by the Meaux hospital in a section called Orgemont, was designed to care for chronic patients (three to six month stays) as well as to provide long-term care for pensioners.

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*Franc in 1972 = approximately $ .18 U.S.

Originally planned for 100 patients, it was subsequently expanded to 200. The 200 beds are divided among six nursing units. Other facilities include medical, recreational, and technical services. Nursing units consist of 4-bed, double, and single rooms.

Group facilities for patients include dining, library, and game areas. Large glass areas looking out onto the grounds are featured.

The building is sited on steeply sloping terrain and surrounded by gardens, with a pool and walkways. The design has taken advantage of the slopes to insure that each of the two stories has at least one ground-level exit to the gardens, where patients may stroll or sit in good weather.

Construction is primarily precast; interior partitions are surfaced with vinyl-impregnated fabric. The lobby floor is marble; in other areas the slab is surfaced with ceramic or vinyl tile.

The U.S. visitors observed numerous design and construction features which were designed to create a pleasing environment and yet could be considered hazardous to elderly patients, among them the floor finishes and stair details. As an example, the most dramatic feature of the patients' dayroom was a central pond, complete with fish and acquatic plants, which the staff explained had been placed there for the patients' entertainment on days when inclement weather kept them out of the gardens. Noting that the pond had no guardrail, the U.S. team inquired about accidents, and were told that only one person had ever fallen into the pond—and that person was a member of the staff.

The new general hospital (see fig. 3) is located in the center of the town, and consists of 500 medical, surgical, obstetric, and pediatric beds, with the necessary supporting services. It has a service population of 100,000, in a 15-kilometre (approximately 9-mile) radius.

As in several other hospitals visited, ancillary services are housed in a separate block, and nursing units are organized in three wings in a "T" shape, and joined to the service block by a walkway (see fig. 4).

The "sawtooth" facades were reminiscent of similar configurations in the U.S.

5. Hôpital Univeristaire du Bocage, Dijon

Dijon, 311 km. (193 miles) southeast of Paris, in the Department Cote d'Or, was the ancient capital of Burgundy, and the seat of the Capetian and later the Valois dukedoms.

It is now an industrial center with a population of 150,000, but is better known as one of the centers of French gastronomy. In addition to the famous mustard to which it has given its name, it is known for its chocolate and perhaps most notably, for its wines. Some of the most famous of the Burgundies are made near Dijon, in wineries that in some cases date back to the 13th Century.

The Hôpital Universitaire is a large regional hospital arranged in a T-shape, a configuration encountered frequently in French hospitals visited. Medical and surgical nursing

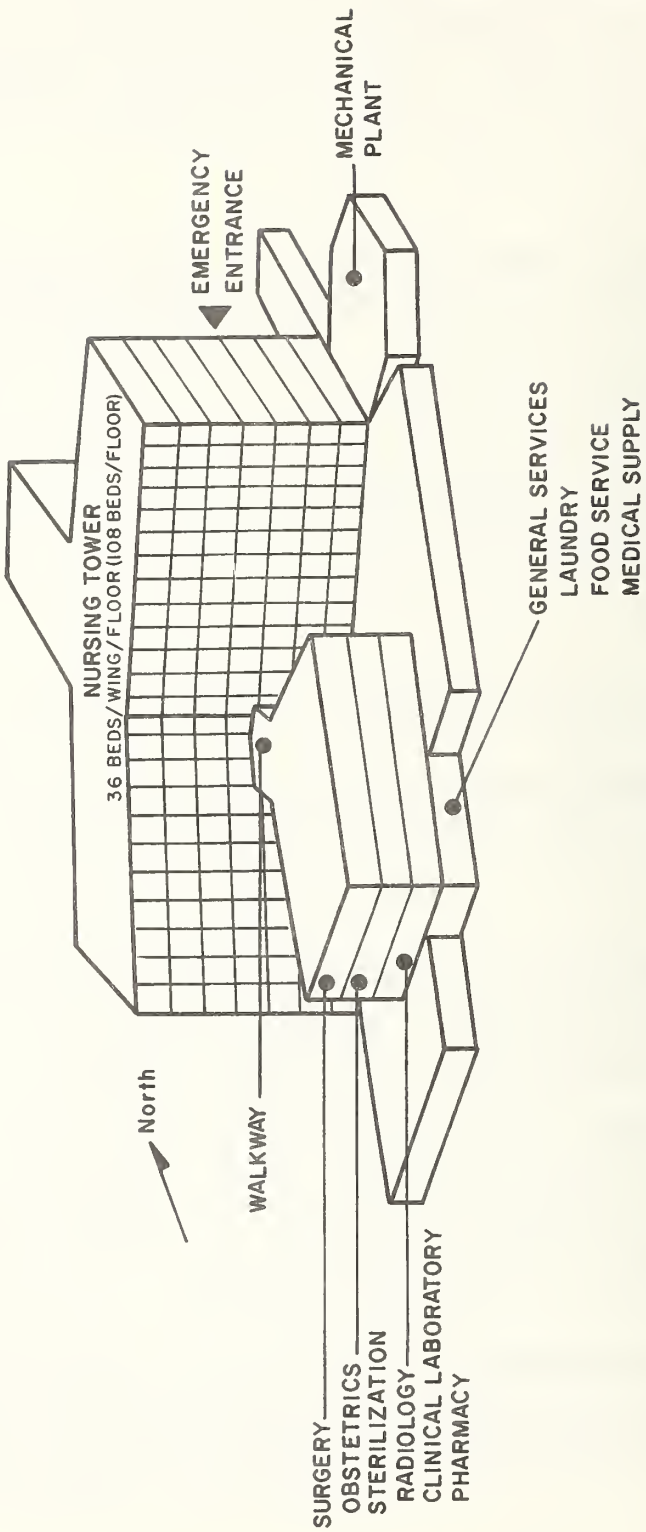

FIGURE 3. SCHEMATIC: THE MEAUX HOSPITAL, MEAUX, FRANCE.

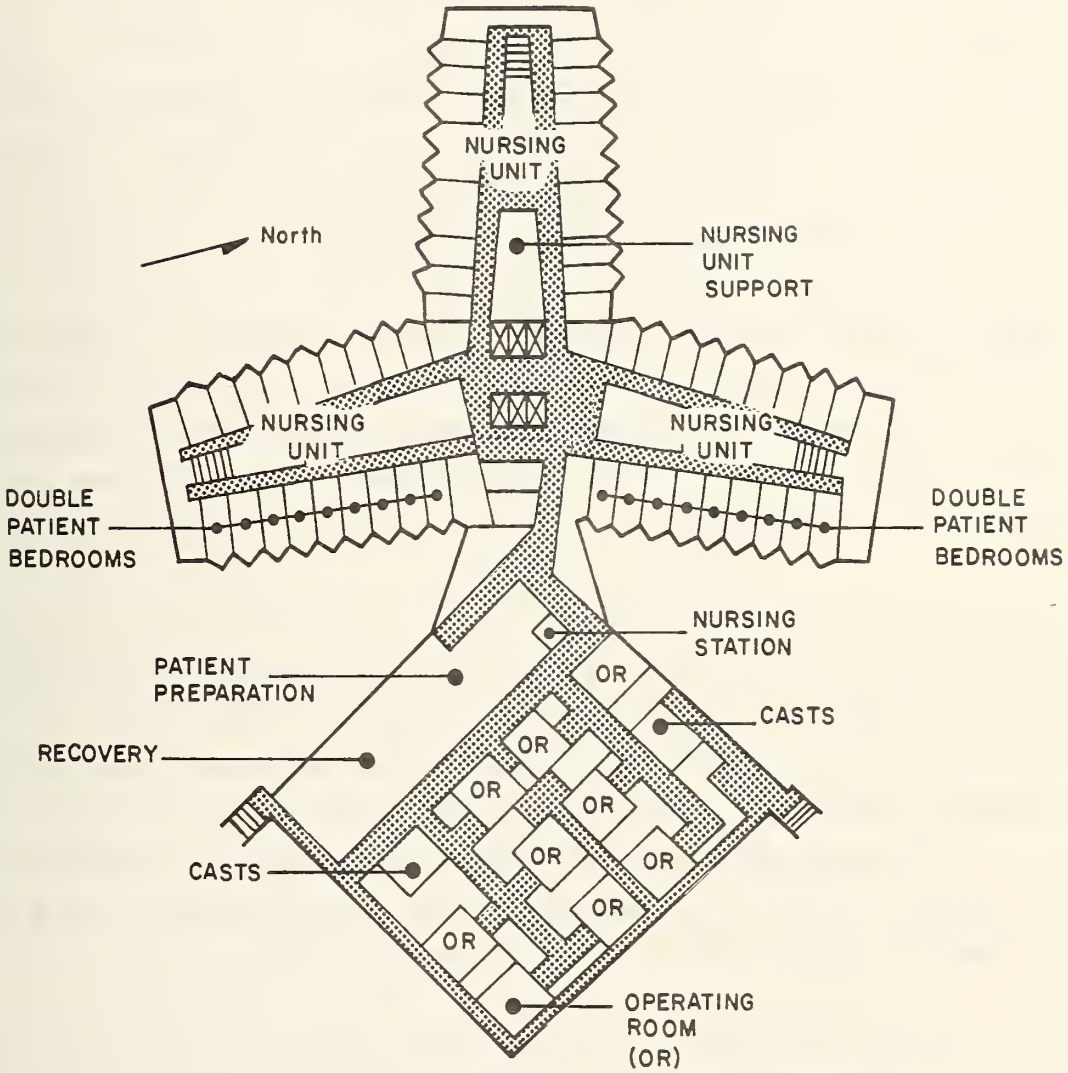

FIGURE 4. TYPICAL FLOOR: THE MEAUX HOSPITAL, MEAUX, FRANCE.

units are located in the horizontal bar of the T; the perpendicular bar is the "medical block" with outpatient and treatment facilities, labs, and administration.

A two-story building (actually three plus basement—the French do not count the rez-de-chaussee, or ground floor) to the east of the main hospital contains the pharmacy, surgical suite and central sterilization. Another building to the west contains morgue, chapel, and other services. Nurses' quarters and other personnel living quarters are located to the north, near the main hospital entrance.

Construction is mainly reinforced concrete with an aggregate finish on the exterior. Sun control is achieved by means of exterior-mounted rolling shutters of anodized aluminum, with inside controls. This feature was also found in many other French hospitals.

The aspect of the Dijon hospital of greatest interest to the members of the U.S. team was the emergency service. The hospital provides 24-hour service over a 30-kilometre (approx. 19-mile) radius. Many patients are victims of highway accidents. An average of two attempted suicides is also treated daily, mostly from barbiturate overdoses. An artificial kidney machine in the emergency service area is used for this barbiturate detoxification.

The hospital maintains a helicopter-ambulance for picking up accident victims, and also for transporting other patients—including premature infants—to Dijon from smaller communities. In addition, a fleet of surface ambulances is maintained and scheduled so that there are always two ambulances available for dispatch.

Another interesting feature of the emergency facility was a quick-wash area capable of accepting stretcher patients and a necessity for cleaning up emergency patients prior to treatment or surgery, since many are farmers who have been injured in their fields, or industrial workers.

6. Hôpital de Beaune (Beaune Hospital) and Hospices Civil de Beaune

The Beaune hospital (see fig. 5) was a prototype for a number of hospitals built, or to be built, using highly industrialized construction, in various areas of France and abroad. Because it was to be a prototype, the architects had developed an elaborately documented program for the hospital, with four main objectives: optimization of investment, shorter lengths of stay for patients, flexibility, and maximum use of industrialization.

The program accounted for the life-cycle cost of the facility. Stating that hospital operating cost could be projected as equalling construction cost in around three years, the architects held that a 10 percent reduction in operating cost would equal from 25 to 30 percent of the capital investment over a ten-year period. (The program statement hastened to caution, however, that humanity must not be sacrificed to fiscal success: "The hospital is not simply a factory, and humanization is an imperative for which we pay a certain price.")

The objective of reducing length of stay was defended on the basis that shorter patient stays would not only make the hospital more "productive" in its mission of treating and

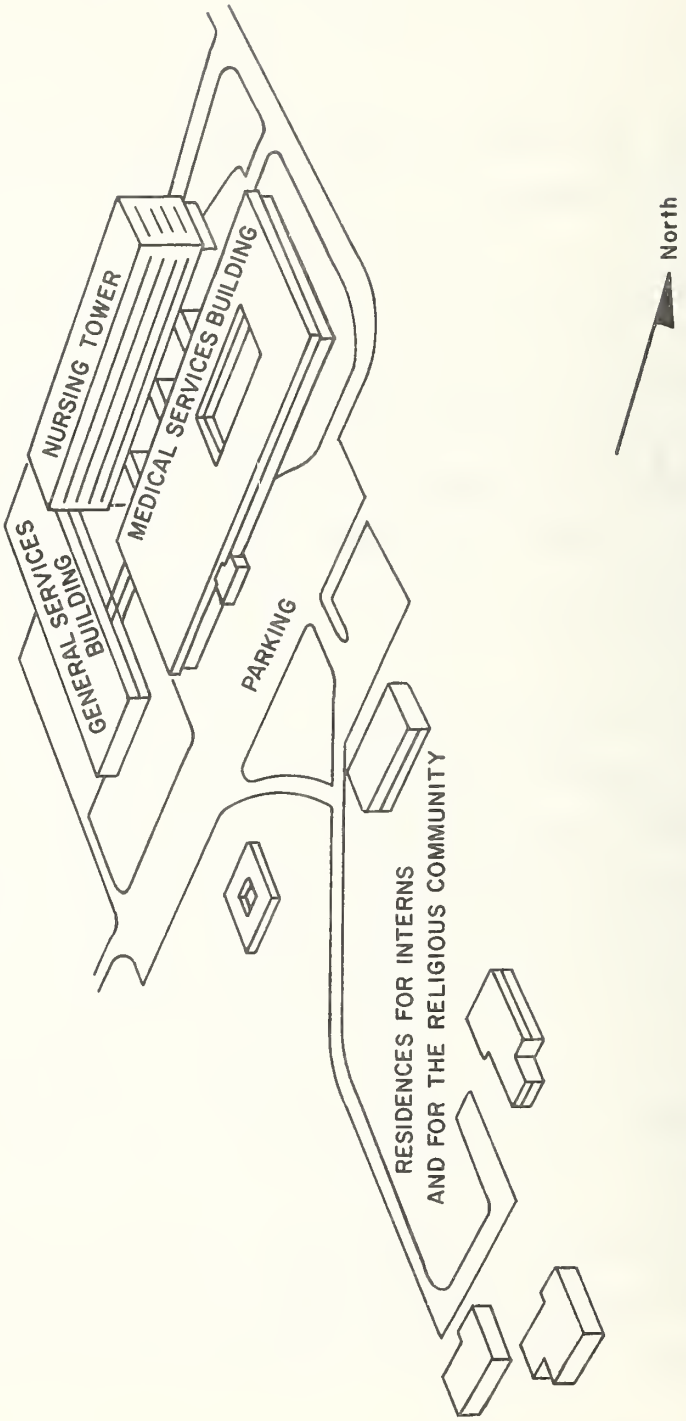

FIGURE 5. SCHEMATIC: BEAUNE HOSPITAL, COTE D'OR, FRANCE.

curing the sick, but would result in gains to the national economy since patients would be dismissed from the hospital and would be able to return to work more quickly.

Flexibility was considered a necessity in order to allow the facility to adapt to future needs; the program made an eloquent argument for flexibility even at the price of increased construction cost.

The concept of industrialized construction was considered important since the hospital was a prototype, although it was claimed that the plan would permit numerous variations in other institutions. The structure was reinforced concrete; lift-slab construction was used. Facades were industrial curtain-wall type. Construction was accomplished in 18 months (although four years had been devoted to planning and design).

Nursing units were arranged on a double-corridor plan (see fig. 6); rooms were single or two-bed rooms with private baths. The hospital was air-conditioned, and each patient was provided with telephone, piped music, and television. Closed-circuit TV was also used.

By way of contrast, the team visited the old hospital, The Hospices Civil de Beaune, parts of which date back to the 15th century. Despite its age, the hospital was in use until recently; it has subsequently been turned into a museum. The hospital still contains its curtained beds (once occupied by four patients at a time). Walls were of thick stone, and the roof was timber in the form of an inverted ship's hull.

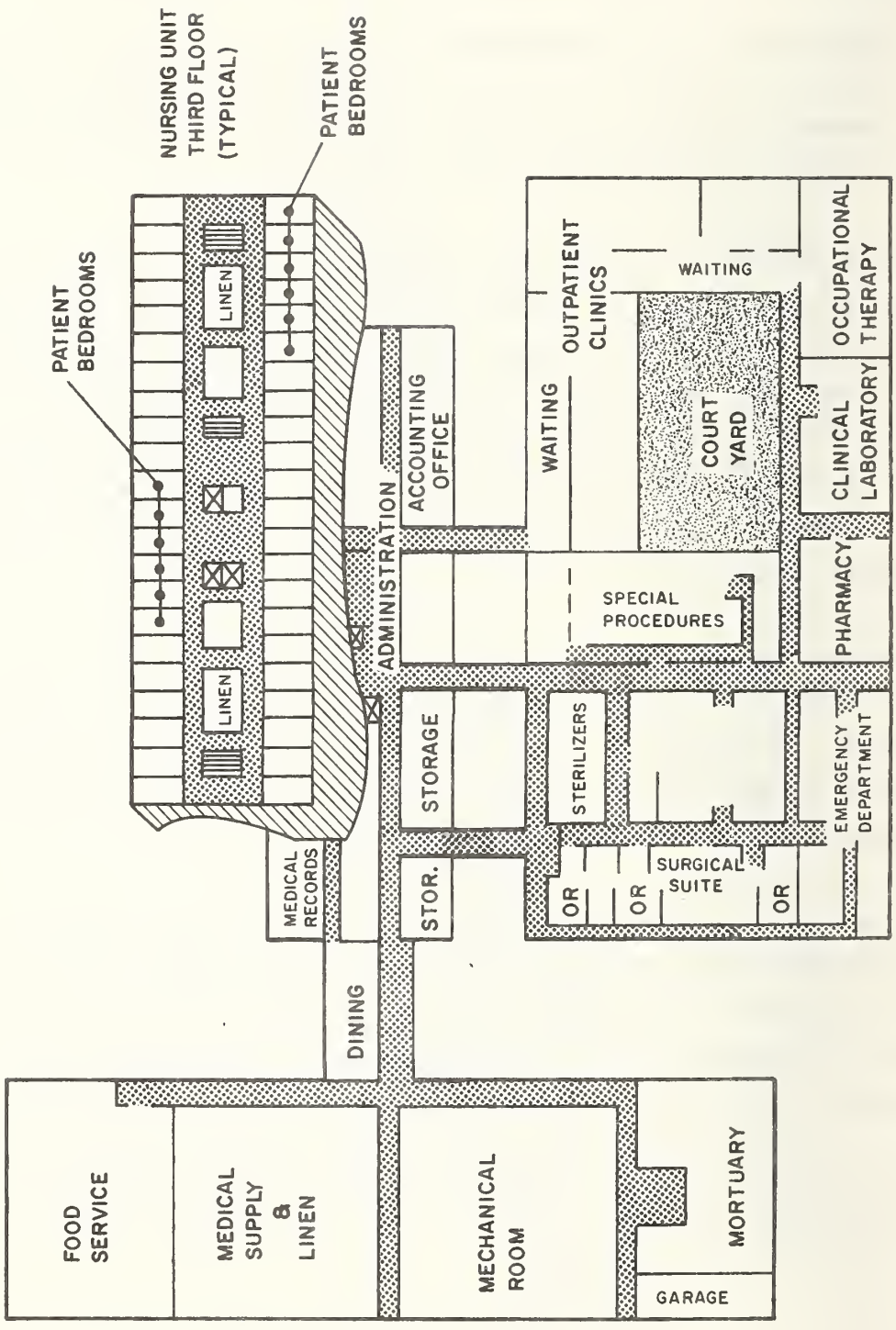

FIGURE 6. FLOOR PLAN: THE BEAUNE HOSPITAL BEAUNE, FRANCE.

7. Hôpital Cardiologique, Hôpital Neurologique, Centre International des Recherches sur le Cancer (Cardiologic and Neurologic Hospitals and International Cancer Research Center), Lyon

Lyon is, paradoxically, one of the oldest and one of the most modern cities in France. It combines 2,000-year-old Roman ruins with automated factories and modern freeways. For years the center of the French textile industry, it is also a gastronomic Mecca for gourmets who enjoy the distinctive Lyonnaise cuisine.

It also, according to a guide published in 1971, possesses more hospitals than any other city in Europe (see fig. 7). This is largely the result of a recent decision to centralize a number of specialized medical facilities in the city and its environs. The total result of this centralization is the Hospices Civil de Lyon, a university-center complex totaling over 8,000 beds, plus a 500-bed facility for the elderly. This is in addition to several existing facilities including the Hôpital Edouard Herriot, an enormous complex of individual pavilion-type hospitals begun shortly after World War I, but not completed until 1934.

The U.S. team visited the cardiology hospital (Hôpital Cardiovasculaire et Pneumologique), a modern facility designed to the same over-all program criteria as most of the other recent health facilities, namely, flexibility, industrialization, and humanity.

As in several other institutions, serious efforts had been made to separate nursing units from medical and general services. In this case, the separation was vertical, with nine stories of nursing units placed over a block containing outpatient and service facilities.

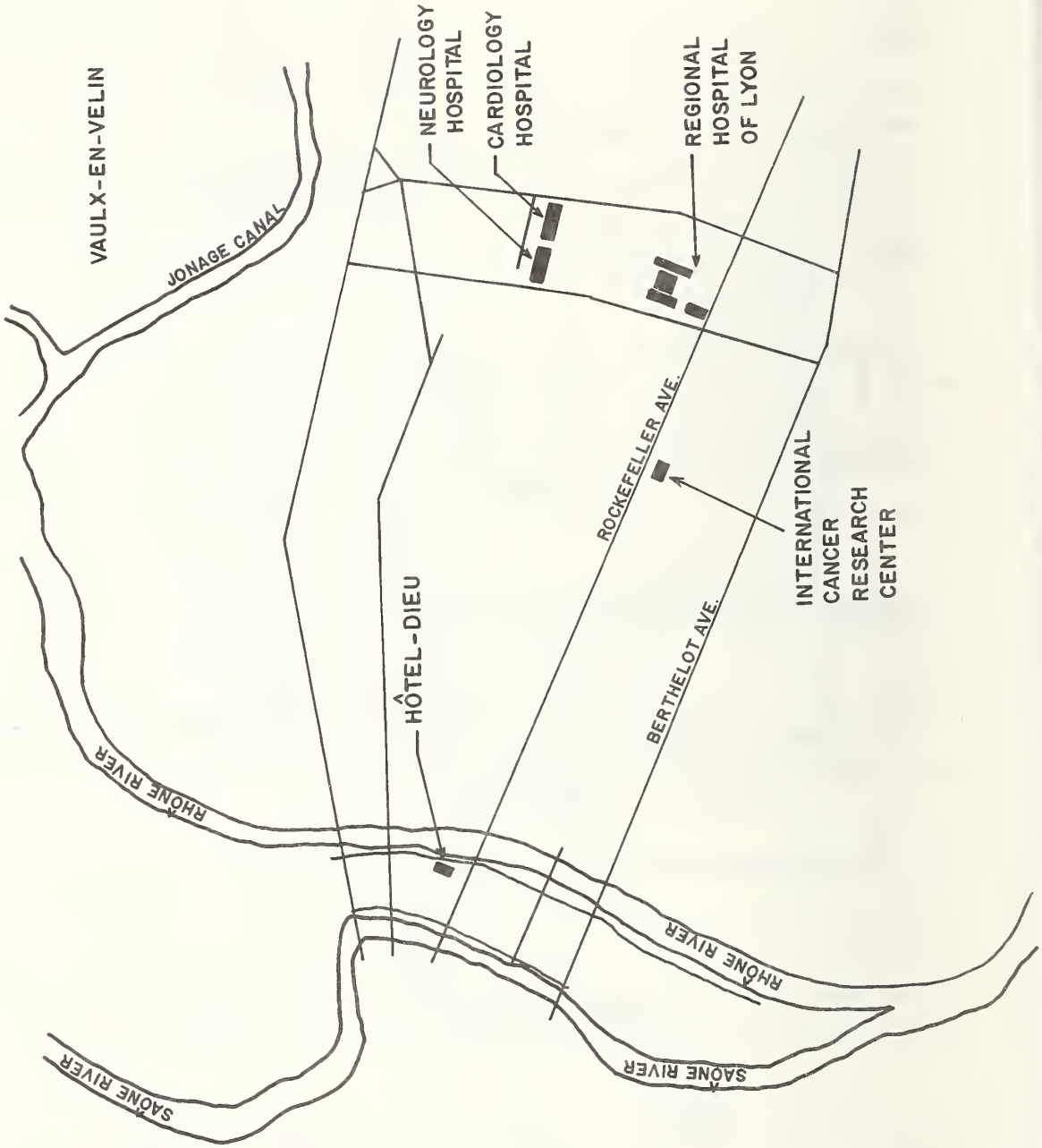

FIGURE 7. MEDICAL FACILITIES VISITED LYON, FRANCE.

A feature of the hospital is a suspended level or gallery between the service block and the nursing floors, for plumbing, medical gases, etc. The structural system was based on a modular horizontal and vertical grid; a 3.25 meter (10.66 ft.) module was used. Structure is of reinforced concrete, and building elements were standardized for ease of factory fabrication. An effort was made to gain a maximum of column-free space in the upper floors by increasing column spacing as the loading decreased, thus increasing the size of bays.

Each element—the service block, the suspended gallery level, and the nursing floors—was given a distinctive exterior treatment. A considerable amount of color was used in interiors, for two primary purposes—identification and orientation, and an attempt to avoid monotony and an "institutional" look. Visually the most striking elements are an abstract relief on the facade of the surgical block, and a sweeping entrance-ramp.

There was considerable automation in this facility, in contrast to other facilities visited in France, including an automated dietary service, operated on a time-sharing program through the IBM center in Lyon. Patients selected their meals by means of IBM punch-cards; items forbidden by their individual medical regimens were automatically deleted. Closed-circuit color TV was used for teaching, particularly in the cardiac surgery service.

Total cost of the hospital, including equipment, was estimated at 77 million francs (U.S. $14 million). Critical path scheduling methods were used during fabrication of the building elements and construction.

The team also paid a brief visit to the adjacent neurological hospital, where the chief item of interest was a sleep-research unit for the study of neurological functions and disorders. Volunteers were used as research subjects. The unit was soundproofed and isolated to permit the conduct of research.

Dr. Abdellah of the U.S. team also visited the Centre Anticancereux Leon Bezard, a cancer hospital, and other members of the team visited a facility of the Centre International des Recherches sur le Cancer (CIRC). The latter is not a hospital, but a modern highrise building which serves as the central administrative and applied-research center. Housed in a 14-story building because of site limitations, the center features a service and elevator core with offices, laboratories, and animal facilities located around the perimeter.

The team also visited another Institut Medico-Educatif (IME) in the suburb of Vaulx-en-Velin.

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Meaux

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VIII. ACKNOWLEDGEMENTS

The authors and the U.S. team members would like to acknowledge the gracious assistance and help that Messr. Georges Hierholtz (CSTB) and Jean Bongrand (Ministry of Health provided throughout the teams' visit to France.

The contributions of Dr. Faye G. Abdellah, Robert L. Rosenberg, Viggo P. Miller and Laurence O. Gibbons, whose draft field reports provided valuable assistance in preparing this document is gratefully acknowledged. Marilyn Ludwig's work in researching and translating various source documents, and in preparing draft manuscripts, provided a valuable basis for this report.

Architects of various facilities visited were also most generous in providing information concerning the facilities; their help is gratefully acknowledged.

Finally, the authors express their appreciation to Jacqueline LaScola for her support in preparing the type-written manuscript.

APPENDIX

DETAILED ITINERARY AND LIST OF PERSONNEL CONTACTED - U. S. TEAM VISIT TO FRANCE ON THE PLANNING AND DESIGN OF HEALTH AND MEDICAL FACILITIES

SATURDAY, APRIL 15, 1972 — WASHINGTON, D. C.

The U. S. Team departed Washington, D. C.'s National Airport at 4:50 p.m. and arrived the next day, Sunday, April 16, in Paris.

MONDAY, APRIL 17, 1972 — PARIS

9:30 a.m. to 2:00 p.m. The U. S. Team was greeted at the Centre Scientifique et Technique du Batiment (C.S.T.B.) and given a briefing of the visit. The following personnel were contacted:

Dr. Gerald Blachere	Director, Centre Scientifique et Technique du Batiment (C.S.T.B.) 4 Avenue du Recteur Poincaré Paris 16e
Messr. Georges Hierholtz	Ingénieur en Chef Chargé des Affairs Internationales Centre Scientifique et Technique du Batiment (C.S.T.B.) 4 Avenue du Recteur Poincaré Paris 16e
Messr. E. Farhi	Centre Scientifique et Technique du Batiment (C.S.T.B.) 4 Avenue du Recteur Poincaré Paris 16e
Messr. Noël	Centre Scientifique et Technique du Batiment (C.S.T.B.) 4 Avenue du Recteur Poincaré Paris 16e
Mme. Yvette Tanel	Centre Scientifique et Technique du Batiment (C.S.T.B.) 4 Avenue Recteur Poincaré Paris 16e
Doctor Edgar Piret	Consular Embassy of the United States 2 Avenue Gabriel Paris
Mr. Allen Greenburg	Science Officer Embassy of the United States 2 Avenue Gabriel Paris

2:00 p.m. to 6:00 p.m. The U. S. Team visited the Ministère de la Sante Publique et de la Securite Sociale (Ministry of Health and Social Security) and were briefed on various aspects of health care delivery in France. Personnel contacted included:

Dr. Charbonneau	Director General of Health Ministére de la Santé Publique et de la Securité Sociale 14 Avenue Duquesme Paris, 9eme
Messr. Verlhac	Ministére de la Santé Publique et de la Securité Sociale 14 Avenue Duquesme Paris, 9eme
Messr. Jean Bongrand	Chief of Services for Construction and Equipment Hospital Directorate Ministére de la Santé Publique et de la Securité Sociale 14 Avenue Duquesme Paris, 9eme
Docteur Georges Dorche	Chief de la Division de la Conception Hospitalière à la Direction Générale de la Santé Ministère de la Sante Publique et de la Securité Sociale 14 Avenue Duquesme Paris, 9eme
Messr. Baudoin	Directeur des Hopitaux MSPSS Ministére de la Santé Publique et de la Securité Sociale 14 Avenue Duquesme Paris, 9eme

TUESDAY, APRIL 18, 1972 — PARIS

8:30 a.m. to 2:00 p.m. The U. S. Team was briefed at the Ministry of Health of the evolution of current concepts of health care delivery in France.

2:00 p.m. to 6:00 p.m. The U. S. Team visited the Clamart Hospital of the Public Assistance Agency of Paris. The following personnel were contacted:

Messr. Marcel Sienoneet	Assistant Director of Hospitals Direction des Hopitaux De l'Assistance Publique de Paris
Messr. Guy Surand	Administrator, Directeur des Equipements Direction des Hopitaux De l'Assistance Publique de Paris
Messr. M. Degardin	Director, Hopital de Clamart 157, Rue de la Porte de Trivaux Paris

WEDNESDAY, APRIL 19, 1972 PARIS

8:30 a.m. to 2:00 p.m. With the exception of Mr. Kramer and Mr. Rosenberry, the U. S. Team attended a briefing at the Ministry of Health. Mr. Kramer and Mr. Rosenberry accompanied Mr. Hierholtz, C.S.T.B., for a field inspection of:

- o Industrialized housing project
- o New town of Iyry
- o Fabrication plant for industrialized concrete housing components

2:00 p.m. to 6:00 p.m. Mr. Kramer, Dr. Abdella, Mr. Rosenberry and Mr. Smith visited the Institut Medico-Educatif (I.M.E.) at Sarcelles and St. Denis. Dr. Bruno, Mr. Miller, Mr. Gibbons and Mr. Gerber visited the Cancer Hospital and Research Center in Paris. The following personnel were contacted:

Messr. Perchat	
Messr. Gilbert Lacombe	Ingénieur des Arts et Manufactures Directeur Technique Ste, Constructions Edmond Coignet 11 Avenue Myron Merrick Paris 8e
Mme. Mano	Agent of the Mayor St. Denis
Messr. Dos Santos	Directeur I.M.E. de Saint-Denis Rue Pierre Brossolette St. Denis
Mlle. Hazemann	Directeur Administratif Affairs Sociales I.M.E. de Saint-Denis Rue Pierre Brossolette St. Denis
Messr. Manade	Directeur Education Administration I.M.E. de Sarcelles Chemin des Coquetiers Sarcelles, Haut du Roi
Professor Denoix	Director, IGR Villejuif 16, Bis Avenue Paul Vaillant Couturier
Dr. Delcour	IGR Villejuif 16, Bis Avenue Paul Vaillant Couturier

THURSDAY, APRIL 20, 1972 — PARIS

8:30 a.m. to 2:00 p.m. The U. S. Team was briefed at the Ministry of Health.

2:00 p.m. to 6:00 p.m. The U. S. Team visited the Institute National de la Sante et de la Recherche Medicale (I.N.S.E.R.M.). The following personnel were contacted:

Docteur J. Nunez	Unite de Recherches sur la Glande Thyroide et la Regulation Hormonale INSERM Centre Hospitalies de Bicetre 94 Bicetre
Docteur D. Alagille	Unite de Recherches d'Hepalogie Infantile INSERM Centre Hospitalies de Bicetre 94 Bicetre
Docteur Charles Wira	INSERM Centre Hospitalies de Bicetre 94 Bicetre
Doctor L. F. Cavazos	INSERM Centre Hospitalies de Bicetre 94 Bicetre
Mme. Renee Gerdy	INSERM Centre Hospitalies de Bicetre 94 Bicetre
Mme. Josette Zeraffa	Centre de Documentation INSERM Centre Hospitalies de Bicetre 94 Bicetre

FRIDAY, APRIL 21, 1972 — PARIS/CRETEIL

8:30 a.m. to 6:00 p.m. The U. S. Team visited the Centre Hospitalier et Universitaire of Creteil. The following personnel were contacted:

Messr. François Hoquet	Directeur de Group Hospitalier Hopital Henri Mondor 51, Avenue de Lattre de Tassigny Creteil
Messr. de L'Ecluse	Chief, Public Relations L'Assistance Publique de Paris

SATURDAY, APRIL 22, 1972 — PARIS

Free for members of the U.S. team with the exception of Dr. Anthony Bruno of the National Cancer Institute. Dr. Bruno left Paris for a flight to Lyon where he was met by Messr. Veyret, Director General, Hospices Civils de Lyon.

SUNDAY, APRIL 23, 1972 — PARIS

Free for members of the U.S. team. Dr. Anthony Bruno toured the facilities of Hospices Civils de Lyon and visited the Centre International de Recherches sur le Cancer.

MONDAY, APRIL 24, 1972 — PARIS/MEAUX

8:30 a.m. to 7:00 p.m. The U.S. team departed Paris for the town of Meaux. In Meaux, the team visited a geriatric facility and the new central hospital being constructed at Meaux. The following personnel were contacted:

Dr. Delinselle	Director General Centre Hospitalier de Meaux Meaux
Dr. Jean-Louis Happert	Maire-Adjoint, Presedent de la Commission des Affairs Sociales de l'Hygiene et de la Sante, Chief of Medicine Centre Hospitalier de Meaux 49, Cours Penteville-77-Meaux
Messr. Jacques Grillot	Engineer for Planning and Coordination, Centre Hospitalier de Meaux 54 Avenue Lily La Celle 78, St. Cloud
Messr. Gilbert Bury	Chargé de Mission Direction Technique et Recherche Société Centrale Immobilière de la Caisse des Dépôts (S.C.I.C.) 4, Place Raoul Dautry Paris, 15e
Messr. Lazaux	Société Centrale Immobilière de la Caisse des Dépôts (S.C.I.C.) 4, Place Raoul Dautry Paris, 15e
Messr. Willy-Paul Romain	Public Relations Société Centrale Immobilière de la Caisse des Dépôts (S.C.I.C.) 4, Place Raoul Dautry Paris, 15e
Messr. Jacques Bourdillon	Director General Société Central Pour l'Equipment du Territoire-International (S.C.E.T.) 4, Place Raoul Dautry Paris, 15e

Messr. Louis Pierre Van Den Brvie	Civil Engineer Mediterranean and Middle East Directorate Société Centrale Pour l'Equipment du Territoire-International (S.C.E.T.) 4, Place Raoul Dautry Paris, 15e
Messr. Yvon Bothorel	Engineer Société Centrale Pour l'Equipment du Territoire-International (S.C.E.T.) 4, Place Raoul Dautry Paris, 15e
Messr. Roland Mendelssohn	Architecte Urbaniste Diplômé dar le Gouvernement
Messr. Max Doignon Tourier	Architect-Engineer

That evening, the U.S. team traveled by bus from Meaux to Dijon where they were met by Dr. Anthony Bruno.

TUESDAY, APRIL 25, 1972 — DIJON/BEAUNE

8:30 a.m. to 10:30 a.m. The U.S. team visited the emergency department of the Centre Hospitalier Regional de Dijon. The following personnel were contacted:

Messr. Lefever	Director, Centre Hospitalier Regional de Dijon 2, Boulevard du Lattre de Lassigret Dijon
Dr. B. Franc	Chief, Recovery Department Emergency Department Centre Hospitalier Regional de Dijon Dijon

10:30 a.m. to 5:00 p.m. The U.S. team proceeded by bus from Dijon to Beaune. In Beaune, the team visited the Hospices Civils de Beaune and the new Beaune Hospital. The following personnel were contacted:

Messr. Chanembaud	Director, 1'Hopital de Beaune Beaune
Messr. Bergeret	Administrator Hospices Civil de Beaune 21 Beaune
Messr. le Maire	Hostel du Ville 21 Beaune
Messr. Venceanne	22 Avenue Edouard-Herriot 92 Le Plessis-Robinson Beaune

In Beaune, Dr. Anthony Bruno of the National Cancer Institute left the U.S. team to travel back to Paris for a return flight to the United States. That evening, the remainder of the U.S. team drove from Beaune to Lyon.

WEDNESDAY, APRIL 26, 1972 LYON

9:00 a.m. to 2:30 p.m. The U.S. team visited the 1'Hôpital Cardiologique and 1'Hôpital Neurologique of the Centre Hospitalier et Universitaire of Lyon. The following personnel were contacted:

Messr. Halbout	Director 1'Hôpital Cardiologique and 1'Hôpital Neurologique 59 Bd Pinel 69 Lyon 3e
Professor Fromont	Chief of Cardiology 1'Hopital Cardiologique 59 Bd Pinel 69 Lyon 3e
Dr. Amiel	Radiologist 1'Hopital Cardiologique 59 Bd Pinel 69 Lyon 3e
Dr. Milon	Cardiologist 1'Hopital Cardiologique 59 Bd Pinel 69 Lyon 3e
Messr. M. Liurard	Assistant Director 1'Hôpital Cardiologique and 1'Hôpital Neurologique 59 Bd Pinel 69 Lyon 3e
Madame Claire Lacaille	Public Relations 1'Hôpital Cardiologique and 1'Hôpital Neurologique 59 Bd Pinel 69 Lyon 3e

The following personnel joined the U.S. team for lunch:

Mr. Peter Tarnoff	Consul Consulate General of the United States 7, Quai General Sarrail Lyon 6e, Paris
Dr. Walter Davis	Chief of Education and Fellowships Program Centre International de Recherches sur le Cancer 16 Avenue Marechal Foch 69 Lyon 6e

(Dr. Davis represented Messr. le Pr Higginson, Director, Centre International de Recherches sur le Cancer)

WEDNESDAY, APRIL 26, 1972 (Continued) LYON

Messr. Veyret	Director General, Hospices Civils de Lyon 3, Quai des Celestins 69 Lyon 2e
Messr. Chaine	Administrator, Hospices Civils de Lyon 3, Quai des Celestins 69 Lyon 2e
Messr. Martin Sibille	Manager Ecole de Sante Militaire 18 Avenue Berthelot 69 Lyon

2:30 p.m. to 5:00 p.m. The U. S. Team visited the Hospices Civils Museum, Hotel-Dieu. The following person was contacted:

Miss Roubert	Hotel Dieu 1, Rue de l'Hopital 69 Lyon 2e

THURSDAY, APRIL 27, 1972 LYON

8:30 a.m. to 5:00 p.m. Dr. Faye Abdellah, Assistant Surgeon General of the U. S., left the U. S. Team for a tour of the Centre Anticancereux Leon Bézard in Lyon. The following personnel were contacted:

Professor Dagent	Director and Chief of Surgery Centre Anticancereux Leon Bezard 28 Rue Laennec Lyon 8
Madame Helen Falchiron	Director of Nursing Centre Anticancereux Leon Bézard 28 Rue Laennec Lyon 8
Madame Monique Stap	Assistant Director of Nursing Centre Anticancereux Leon Bézard 28 Rue Laennec Lyon 8

8:30 a.m. to 11:45 a.m. The U. S. Team was driven to the Centre International de Recheres sur le Cancer, 16 Avenue Maréchal Foch, Lyon, for a tour of the facilities. Dr. Davis escorted the team.

11:45 a.m. to 1:30 p.m. The team left the Centre International de Recherches sur le Cancer for a tour of the facilities of l'Institut Médico Educatif de Vaulx-en-Velin, located in the Lyon suburb of Vaulx-en-Velin. The following persons were contacted:

Messr. Milleux	Director l'Institut Médico Educatif de Vaulx-en-Velin 14, Rue Ferrandiere 69 Vaulx-en-Velin
Messr. Xech	Manager l'Institut Médico Educatif de Vaulx-en-Velin Rue Jean-Marie Merle 69 Vaulx-en-Velin

FRIDAY, APRIL 28, 1972 LYON/PARIS

In the morning, the U. S. Team left Lyon by plane for Paris.

An administrative meeting was held at C.S.T.B. in Paris with Mr. Kramer, U. S. Team, Messr. Blachere and Messr. Hierholtz, C.S.T.B.

1:30 p.m. to 4:30 p.m. A debriefing session was held for the U. S. Team at C.S.T.B. Messr. Blachere, Messr. Hierholtz, C.S.T.B., Messr. Bongrand, Ministry of Health, and others attended.

SATURDAY, APRIL 29, 1972 PARIS

In the morning, an administrative meeting was held by members of the U. S. Team. The afternoon was free.

SUNDAY, APRIL 30, 1972 PARIS

The U. S. Team departed Paris for the United States.

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The U.S. Center for Building Technology (CBT), Institute for Applied Technology, National Bureau of Standards, and the French Centre Scientifique et Technique du Batiment (CSTB) regularly exchange special study teams for selected areas of building technology. This report is on the visit of the U.S. team to France on health care facilities, held in April 1972. The U.S. team consisted of representatives from the Center for Building Technology; the Department of Defense; the Veterans Administration; and the Department of Health, Education and Welfare. The team visited health facilities in Paris, Meaux, Dijon, Beaune and Lyon. Innovative methods for the planning, design and construction of French health facilities were reviewed by the team participants. This report contains the findings and observations of the team. These findings and observations were originally recorded in a letter report which was exchanged with members of the U.S. team and the respective cooperating groups in France. However, it is felt that the documentation of the observations in the open literature is important for record purposes and will provide a source document for future discussions on the planning and design of medical and health care facilities.

17. KEY WORDS (*six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons*) Architecture; building technology; construction; health facilities; hospitals; medical facilities; medical planning

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